

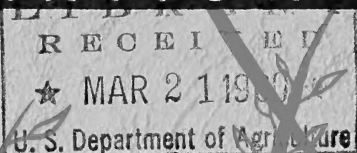
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[1960]

Native Grasses

INFORMATION

BLUE GRAMA
BLUE PANIC
BLUE STEMS
BUFFALO
INDIAN
SAND DROP
SAND LOVE
SIDE OATS GRAMA
SWITCH
TALL OATGRASS
WEeping LOVE
WHEATGRASSES
OTHERS



RUDY-PATRICK SEED CO.

KANSAS CITY, MO.

HUTCHINSON, KANS.

ST. JOSEPH, MO.

Published bulletins, pamphlets and circulars of State Agricultural Experiment Stations, and the United States Department of Agriculture, and the pamphlet "Native Grasses, Legumes, and Forbs," published by Phillips Petroleum Company, were used freely in preparation of this manual. For the information provided, a grateful acknowledgement is extended.

GRASS GROWS GREEN

.. PREVIEW ..

You and I, particles of infinity, fellow travelers for awhile in the span of life's great adventure, are joint heirs and beneficiaries of the marvels of creation, of the solar system, of the earth and its fullness. The good earth is a sanctuary for the successive generations of the kingdoms of plants and animals. The music of the spheres is attuned to the reproductive cycle of seed to seed which creates and sustains life on this earth's crust. Over all the earth through the operation of natural forces grass grows green. In suspended animation the seed with warmth and moisture in the soil germinates and produces a plant. In growth it manufactures its own food which becomes the essence of life for human-animal kind. The atoms of heaven and earth fuse into the alchemy of the humble green grass blade in the concord of the universe.

Such is the central theme of this booklet. With no pretensions to scholarship or authorship, with time limited to stolen but sweet leisure hours, we may be forgiven errors of omission and commission. We wade only in the shallows of the deep waters of science. Thereby is the subject illumined the better to examine the everyday facts and forces that govern human affairs.

Man's mechanism is manifest through the culture of improved selected plants on a thin rind of the earth's crust. We style it agriculture or the cultivation of fields. Not by conquest as an adversary but by cooperation as an ally with natural laws we reap earth's fruits.

Agriculture and allied functions represent the world's greatest industry. It surpasses in total employment, in volume, and in the intangibles of human happiness with kinship to the soil and the living world of plants. From the seed germinating in the soil man extracts food to sustain life and supply energy, fiber to clothe the body with warmth and color and wood products for shelter and fuel. Agriculture is the keystone to the structure of civilization.

With a world population of 2,250,000,000 souls and a prospective increase to 3 billion by the close of the century, these figures represent an increase from around 450,000,000 in about three centuries. They suggest an examination of the treasury of the seed and the soil to support the ratio of population increase. The modern accent on Grass Land culture in the conservation of the precious top soil mounts from the ground swell of these hidden forces. The major problem of all nations is the adjustment of human society to the land. Social institutions, the progress of civilization and the peace of the world depend on the well nourished contentment of the races of mankind. Governments rise and fall as grass grows green, for all the population.

By Ross M. Eldridge
President, Rudy-Patrick Seed Company

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Bulletins giving more detailed information on the above are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. — Price 5 cents.

GRASSES FOR YOUR LAND



The above map of the United States divides the country into areas where rainfall, temperature range, and soil types determine the adaptability of different grasses. On the following pages you will find, under "Adaptation and Use," the different area numbers that the grasses are to be found in.

B L U E S T E M

BIG BLUESTEM **(*Andropogon furcatus*)**

Big Bluestem is a native warm season, perennial tall grass, with short, scaly underground stems and roots. It saturates the top two feet of soil, and may reach depth up to 12 feet. It begins growth in early April, and feed stalks three to eight feet tall appear from late August to October.

ADAPTATION AND USE **(Areas 7-8-5-6)**

Big Bluestem is adapted to the eastern half of Oklahoma and Texas, to a small area in northwestern Arkansas, and what is known as the "Tall Grass Prairie," as well as in a greater part of the prairies east of the 30-inch rainfall belt. It may occur on lowlands and areas of rapid infiltration west of this belt. Except in the strictly Tall Grass sites, it occupies the lowest slopes, because it needs more moisture than does Little Bluestem. It is usually found mixed with Little Bluestem and Indian Grass.

ADVANTAGES

It is used for hay and grazing. Of the prairie grasses, few equal Big Bluestem in quantity or quality of forage produced — It is relished by livestock and usually eaten in preference to other grasses in any of the mixtures.

MANAGEMENT

Big Bluestem should not be grazed shorter than six to eight inches during the growing season. If continually grazed closer than this, it decreases and is replaced by less productive plants. Through over-use and abuse,

this native grass has been killed out or greatly reduced on most of its original area since 1885 — It can be seeded in pure stands or with mixtures in other tall and mid-grasses. Should be cut for hay soon after bloom. Refer to General Management of Native Grasses.

CAUCASIAN BLUESTEM **(*Andropogon intermedius caucasicus*)**

Caucasian Bluestem is a warm season perennial upright bunch grass two to three feet tall, leafy at and near the base, and with rather fine stems. It is distinguished from Kings Ranch Bluestem by the upright, stiff stems which seldom dry a straw color. The normal shorter basal leaves contain some red pigment, and the branched purple panicle has a longer axis.

ADAPTATION AND USE **Area 5-6-4-8-9**

Caucasian Bluestem was introduced from Asia and has been under trial for a number of years in the southern Great Plains area. It is a fair forage and feed producer, but lacks the seedling aggressiveness of Kings Ranch Bluestem.

ADVANTAGES

Suitable for grazing in low rainfall areas — It is reported to be more palatable than many native and introduced Bluestems grown under the same conditions.

MANAGEMENT

Growth starts in early spring. Caucasian should have the same care, generally speaking, as other Bluestems. Refer to General Management of Native Grasses.

KINGS RANCH BLUESTEM
(*Andropogon ischaemum* var.)

Kings Ranch Bluestem is a warm season, deep-rooted semi-prostrate tufted perennial. It was introduced into Texas probably on the Kings Ranch about 1910.

ADAPTATION AND USE
Area 7-8-5-6

It is well suited to a wide range of soils and conditions, and has been used in the central and southern Great Plains area. It is known to be salt tolerant on the Texas Gulf Coast.

ADVANTAGES

Growth is unusually vigorous after drouth - It is strongly competitive with grasses of like or lower stature - Produces seed from June until frost - Will invade short grass and mid-grass pastures - Seedlings survive competition of annuals - Well suited for over-seeding thin and eroded soils for erosion control and for use in conservation cropping systems on crop lands - Livestock graze it readily - It is used for hay, pasture, spoil bank, and dam protection, and vegetating waterways - It is a strong competitor for moisture, and if kept vigorous shows promise of competing with low brush - Productive under irrigation.

MANAGEMENT

Very similar to the other Bluestems. Reference should be made to General Management of Native Grasses.

LITTLE BLUESTEM
(*Andropogon scoparius*)

Little Bluestem is a native warm season, perennial mid-grass, with a dense

root system that reaches at times from five to eight feet in depth. This bunch grass spreads by seeds, fillers, and short, underground root stalks. Growth begins in early April with seed stalks from two to five feet tall appearing from late August to October.

ADAPTATION AND USE
Area 5-6-7-8

It is a native of all states except California, Washington, Oregon, and Nevada. It is one of the most widely distributed perennial grasses in America, and grows well on deep, shallow, sandy, fine textured, and rocky soil. At one time Little Bluestem was the most abundant grass in the midlands of America, and is still the most important grass in the flint hills of Kansas and eastern Oklahoma. Great value for erosion control and regrassing abandoned cropland.

ADVANTAGES

It provides nutritious grazing during the growing season, and has been used for hay since the first days of the settlers. Cattle for many years have been shipped from the south-southwest to fatten on the Little Bluestem range in the Kansas flint hills and the osage hills of Oklahoma. It will produce three fourths to two tons of forage per acre and makes good winter grazing when supplemented with protein and mineral.

MANAGEMENT

Little Bluestem should not be grazed closer than from four to six inches during the growing season. When overgrazed, it finally kills out and is replaced by less productive plants. Refer to General Management of Native Grasses.

GRAMA GRASSES

BLUE GRAMA

(*Bouteloua gracilis*)

Blue Grama is a native perennial, warm season, short grass, with narrow leaves, three to six inches long, that form a curly mass of bunchy sod, June – October. Seed stalks vary from 10 to 20 inches high. This Grama is sometimes mistaken for Buffalo Grass and Hairy Grama.

ADAPTATION AND USE

Area 4–6

It is the most important Grama, and occurs throughout the dryer parts of the Great Plains from Canada to Mexico. It appears to be limited in its spread eastward by low altitude, high rainfall, and taller grass competition. Trials now indicate Blue Grama can be used somewhat east of its natural range off of the Plains. It is used for grazing and erosion control.

ADVANTAGES

It will stand extreme drouth, reviving and making rapid growth when favorable conditions return – It is nutritious, palatable, and eaten by all classes of livestock – It cures out in the fall and retains most of its nutritious value for winter grazing – It usually is an increaser over most tall grasses and mid-grasses where the taller grasses are abused by over-grazing – It provides erosion control.

MANAGEMENT

Should not be grazed closer than two to three inches during the growing season. This short grass can be harvested with a combine and establish readily from seed. Refer to General Management of Native Grasses.

SIDE OATS GRAMA **(*Bouteloua curtipendula*)**

Side Oats Grama is a native warm season, perennial mid-grass, with short, scaly underground stems. Growth begins in early April, and the seed stalks which appear from July to September are from 18 to 36 inches in height.

ADAPTATION AND USE

Area 5–6

It is the most widely distributed of the Grama grasses, and is found throughout the United States east of the Rocky Mountains. It is adapted to a variety of soils and conditions. It is found on the slopes of mountains, is common in shallow and eroded soil, and may be a minor grass in the tall grass prairies. It remains in soils of alkaline reaction in low rainfall and low altitude belts longer than in the neutral or acid soils. It is rare in the sandy soils of the forested coastal plains.

ADVANTAGES

It produces high quality, nutritious, green forage that is readily eaten by all classes of livestock – It increases and tends to replace taller grasses on ranges that are abused – It is a good seed producer and can be harvested with a combine – It can be successfully planted in pure stands or mixtures, and has proven successful on thousands of acres of formerly cultivated land. Fairly good winter grazing, good quality hay if cut at right time.

MANAGEMENT

It will gradually decrease if continually grazed closer than two to three inches during the growing season. It responds very well to nitrogen ferti-

lizer for seed and forage production. Refer to General Management of Native Grasses.

BLUE PANIC (*Panicum antidotale*)

Blue Panic, sometimes called Giant Panic, is a deep-rooted warm-season perennial grass. The plant may reach a height of eight feet under the best growing conditions.

ADAPTATION AND USE Area 6-4-2

The grass has been under trial and cultivation as an introduced plant from Australia for many years. It has been recommended as an irrigated grass legume mixture for Las Cruces and localities existing under similar climatic and soil conditions. In Texas, it has done well in the lower Rio Grande Valley under irrigation, in other parts of the Rio Grande plain, and in the Rolling Red Plains. It has been suggested the grass may have a place in contour areas, and in other places which receive run-off water. Plants of this grass have withstood temperatures of 18 degrees Fahrenheit at Woodward, Oklahoma.

ADVANTAGES

The early vigor of Blue Panic makes it an excellent winter grass in the lower Rio Grande Valley, which has become a factor in the winter grazing of cattle - Planting in the heavy soil on the San Antonio Nursery, irrigated with sewage water, produced remarkable yields of forage and seed - The leaves and stems are very high in nitrogen during periods of rapid growth.

MANAGEMENT

Proper feeding and nitrogen fertilizing seem essential to keep the grass vigorous. It apparently does best on soils high in lime. It does well on gypsum and caliche, where sorghums "gyp" out. It is adapted to stands, but the volume of growth is greatest on fertile type soils. It is easy to establish and maintain on gravelly slopes. It yields most on the medium and coarse texture permeable soils. It is very susceptible to damage by weeds and grasshoppers in the seedling stage. Spraying with 2-4D during the late seedling stage of the grass is fairly effective in controlling weeds. Broad grass seedlings get weedy and lose vigor. Refer to General Management of Native Grasses.

BUFFALO GRASS (*Buchloe dactyloides*)

Buffalo Grass is a native perennial, warm season, sod forming, short grass, that reproduces by seed and vigorous surface runners which root at the joint. The plants are seldom more than five inches tall, and the leaves grow so near the ground that much of the plant remains even under close grazing.

ADAPTATION AND USE Area 5-6

Buffalo Grass is usually found growing with Blue Grama in the lower rainfall part of the Great Plains, and in continually over-grazing area of the tall grass country. Most of the mixed prairies originally contained scattered plants. It is usually absent from or rare in the wetter prairies adjoining timber belts, and in the area west of longitude 104. Buffalo Grass is primarily used for grazing.

ADVANTAGES

It is eaten readily by all classes of livestock, except when dormant during dry periods of the growing season — Furnishes excellent winter grazing in dryer areas if it is cured well — It and Blue Grama are the most important pasture plants of the high plains — It is of great importance in the heavy and loamy soils, and absence of no importance in the sands. Buffalo Grass, because of its desirable turf qualities, is in demand for re-vegetation purposes — Sod in the immediate vicinity of land to be re-grassed has been used — Since seed has been on the market, the increase has been mostly from planting — The seed can be used to re-vegetate golf courses, lawns, athletic fields, air fields, pastures, borrow ditches, and banks along highway and pasture waterways.

MANAGEMENT

Buffalo Grass somewhat protects itself from over-use by growing close to the ground, usually increasing on tall and mid-grass ranges that are abused by over-grazing; however, it is more vigorous and productive when not grazed closer than one to three inches. This seed has been successfully sown in pure stands and mixtures with other short grasses. Refer to General Management of Native Grasses.

Special Note: Treated Buffalo Grass

This is Buffalo Grass that has been treated by a special mechanical process in order to hasten the germination or break the normal dormancy of the seed.

INDIAN GRASS **(*Sorghastrum Nutans*)**

Indian Grass is a native perennial, warm season, tall grass, which reproduces from seed and short, scaly underground stems. The seed heads are on stems from four to eight feet tall.

ADAPTATION AND USE **Area 4-6-5-6-7-8-9**

Indian Grass is found growing throughout the tall grass and mixed grass prairie in the United States, following the Bluestem belt. Its principal use is for grazing pasture, July — September.

ADVANTAGES

It is very nutritious and readily eaten by all classes of livestock, either as green forage or dried prairie hay — On sandy soils it is more important than Big Bluestem — It is used in meadow mixtures in the coastal, grand and eastern Oklahoma prairie. When planted in pure stands, it will produce a ground cover sooner than either Big or Little Bluestem.

MANAGEMENT

This high producing tall grass is a decreaser on Bluestem ranges when continually grazed shorter than five to eight inches during the growing season, and is replaced by less productive plants. Indian Grass seed can be harvested with a combine. It is usually established from seed, and is being planted more each year in pure stands. It responds very favorably to nitrogen fertilizer, which increases seed and forage production. Refer to General Management of Native Grasses.

SAND DROPSEED **(*Sporobolus cryptandrus*)**

Sand Drop is a native, warm season, perennial grass that grows in rather small curves or bunches. Growth begins in early spring, and seed heads appear about September on stems one to three feet tall, July – October.

ADAPTATION AND USE **Area 7-8-5-6**

Sand Dropseed is found growing on sandy open soils throughout the United States except for the eight most eastern states. It is most abundant in the southern Great Plains states of Oklahoma, Texas, New Mexico, Kansas and Colorado. Its principal use is for pasture and regrassing bare areas.

ADVANTAGES

This grass is eaten readily by all classes of livestock during the growing stage, but is unpalatable and poor forage when mature.

MANAGEMENT

Sand Drop produces less forage than other mid-grasses, and is an invader in the true prairie Bluestem belt. However, farther west it is considered an increaser and usually thickens its stand. Even on heavier soils as the better grasses, it is weakened by overuse. Seed is very small and can be combined. Sand Dropseed moves in quickly on disturbed areas, and has been successfully established by seeding on sandy soil. Sand Drop has the characteristic of appearing in new areas due to the fact that it has been carried there by the droppings of rabbits. Refer to General Management of Native Grasses.

LOVEGRASSES

SAND LOVEGRASS **(*Eragrostis trichodes*)**

Sand Lovegrass is a tall, leafy, warm season perennial native bunch grass. It produces a dense, deep root system, and bears seed on stems two to five feet tall in early fall. August-September.

ADAPTATION AND USE **Area 5-6**

Sand Lovegrass has been reported growing in ten central Great Plains states, from Illinois to Colorado to Texas. Its principal use is for winter grazing and for conservation.

ADVANTAGES

It is considered one of the most palatable of native grasses in sandy soils, and valuable because of its early spring growth – when allowed to form seed, it is a good volunteer and has a place in re-grassing sandy or loamy soils of the Plains.

MANAGEMENT

Sand Lovegrass decreases quickly when continually grazed closer than five to eight inches during the growing season, and will usually be replaced by less palatable and less productive plants. It grows best on sandy land, in the 18 to 35 inch rain belt, but is sometimes found on heavier soils. It seldom grows in pure stand; however, from the Experimental Station at Woodward, Oklahoma, they show a grazing test of 105 pounds of seed per acre produced from pure stand. The seed can be combined. It is usually established in mixtures with other grasses. Refer to General Management of Native Grasses.

WEeping LOVEGRASS
(*Eragrostis curvula*)

Weeping Lovegrass is an introduced warm season, perennial bunch grass with a deep, fibrous root system. The seed stems often reach more than a yard in height.

ADAPTATION AND USE
Area 4-6

This Lovegrass was introduced into Arizona several years ago from South Africa and was soon placed on trial in other states. It is apparently adapted to a great variety of soils and conditions, except extremely alkaline soils.

ADVANTAGES

This species has been satisfactory for controlling wind and water erosion, a cover on land and to grow field crops, broad, shallow waterways of low velocity, hay, pasture and soil improvement — It is good for re-grassing abandoned land and should be used for supplement grazing.

MANAGEMENT

It grows on poor, sandy, acid soils, too low in nutrients for field crops, without heavy fertilization, but responds to fertilization in soils of high fertility level. Its reaction to winter temperatures has been contradictory. It appears capable of withstanding rather low temperatures in the presence of adequate soil moisture. It makes good growth in areas of high soil temperatures. Its range is limited to about 15 inches of rainfall and not less than eight inches' fall during the warm months. Refer to General Management of Native Grasses.

SWITCHGRASS
(*Panicum virgatum*)

Switchgrass is a native perennial warm season, deep-rooted, semi-bunch grass. Seed stalks attain a height of from three to six feet. July-October.

ADAPTATION AND USE
Area 7-8-5-6

This fat grass is found growing throughout the Bluestem belt of eastern and central Great Plains, and on certain prairie sites in other parts of the United States. Switchgrass is best adapted to the lower areas of moist soil but is winter hardy and drouth resistant, and thus is found growing under a wide range of soils and climatic conditions. Since it is ordinarily considered a tall grass, it is best suited for hay, either on alluvial soils, or uplands, and for pasture mixtures in semi-humid sections.

ADVANTAGES

It is very nutritious and readily eaten by all classes of livestock, either as green forage or in prairie hay.

MANAGEMENT

This tall grass is a decreaser on Bluestem ranges when continually grazed closer than five to seven inches during the growing season, and is replaced by less productive plants. It has been used with partial success in middle waterways. In the wetter parts of the prairies, it may be found in nearly pure stands. It is usually seeded in mixtures with Bluestem, Indian Grass, and Side Oats Grama. Two distinct strains are recognized — the upland and the bottomland. The bottomland strain has a closer stem and is from one to three

feet taller than the upland strain, and is less desirable for grazing and hay. It is now conceded that the upland form, of medium height growing, in western Oklahoma, is the more desirable one for the pasture and the meadow mixtures. The tall form is well adapted to the alluvial soils. Strains of upland Switchgrass, such as Blackwell and Oklahoma Number 1, are more productive and disease resistant than the wild forms. They are available as certified seed. Refer to General Management of Native Grasses.

WHEATGRASSES

CRESTED WHEATGRASS (*Agropyron desertorum**)

Crested Wheatgrass is a hardy, drouth resistant bunch grass, a perennial introduced from Russia. June-August.

ADAPTATION AND USE Area 3-5

Crested Wheatgrass is widely used on light textured prairie soils where the rainfall is 9 to 15 inches. Here it is planted alone to protect soil from blowing or washing, and in rotation with wheat to improve soil structures. Abandoned farm lands and over-grazed ranges are planted to this grass for pasture. It is sometimes used in legume-grass mixtures on eroded crop land where the rainfall is more than 15 inches, burned over, and heavily grazed lands. It has been widely adapted in the high plains of Texas and Oklahoma, and the general Great Plains area extending on north to the Canadian border. It has been successfully used in irrigated pastures of Oklahoma and the Texas Pandandle, as well as other areas. It has done well on the heavier

soils under dry land conditions. Its general use is for soil improvement and grazing of cattle.

ADVANTAGES

It is palatable to most livestock, and the leaves are less harsh than those of the native western wheatgrasses. The feed value is good if the grass is grazed in the spring and early fall.

MANAGEMENT

It is easy to get good stands of Crested Wheatgrass, and germination of the seed is high. As the young seedlings develop slowly, they must be protected against grazing until they are fully established. Under semi-arid conditions, they require at least two years. Once established, stands of Crested Wheatgrass can remain productive from 10 to 15 years when they are managed right. Under semi-arid conditions, they produce about 1,000 pounds of hay per acre, or provide one animal unit-month of grazing per acre. The grass is grazed in the spring and early fall. It is ready to graze when four to five inches tall, and should not be utilized more than an average of 70%. Remember that it is palatable to livestock as long as it is green. Crested Wheat will produce good seed yields. An annual application of fertilizer that will add approximately 40 pounds of nitrogen helps maintain good seed production. The seed can be harvested with a combine. On heavy soil, with good winter and spring rainfall, Crested Wheatgrass will furnish high protein grazing from late fall until the following June. Refer to General Management of Native Grasses.

*Formerly known as *Agropyron cristatum*.

INTERMEDIATE WHEATGRASS **(*Agropyron intermedium*)**

Intermediate Wheatgrass is a perennial sod-forming grass with heavy root stalks.

ADAPTATION AND USE **Area 5-6-3**

This grass was introduced from the northern and central parts of the Great Plains and Pacific Northwest. It appears to be adapted to a variety of soils and climatic conditions, both for pasture and forage.

ADVANTAGES

It is more drouth resistant than Smooth Brome Grass — Special Note: In some cases, it is less hardy and less drouth resistant than Crested Wheatgrass — Seedling failures are rare — It is one of the easiest grasses to establish, with good records from southern and southwestern Kansas, Panhandle of Texas, western Oklahoma, Colorado, Nebraska, and in the Pacific Northwest.

MANAGEMENT

Intermediate Wheatgrass is compared with Smooth Brome, because these two grasses have about the same adaptation. It requires at least 15 inches of rainfall, and does best at elevations from 1,000 to 3,500 feet. It is well adapted even at elevations of 6,000 feet. The Wheatgrass has produced more ground cover and substantially more hay or pasture than Smooth Brome, whether planted alone or in mixtures. The seasonal growth of Intermediate Wheatgrass is distributed farther into the summer months, and production from stands is maintained better than

Smooth Brome. Intermediate Wheatgrass is high in root production. There is considerably more information available on Intermediate Wheatgrass, which can be obtained through any of the Soil Conservation Agencies.

WESTERN WHEATGRASS **(*Agropyron smithii*)**

Western Wheatgrass is a native, cool-season perennial, sod-forming grass, which reproduces from underground stems and seeds. It starts growth in early fall, remaining green until winter, and makes its maximum growth in the spring. The grass-producing season is in June. It goes dormant in mid-summer. Western Wheatgrass reaches a height of from one to three feet. June-August.

ADAPTATION AND USE **Area 5-6-2**

Western Wheatgrass grows primarily in the Pacific Northwest and Great Plains areas. It is also found in the Great Lakes region, and as far north as Alberta, Canada. Its principal use is for grazing and hay.

ADVANTAGES

Western Wheatgrass is nutritious and readily eaten by livestock during its early growing stage. It makes good quality, high protein hay if cut during the late bloom stage — Western Wheatgrass can stand closer grazing than our taller native grasses, but decreases if heavily grazed, particularly during the spring months.

MANAGEMENT

This grass does best on low areas of heavy soils where run-off water accumulates, and is often found on old lake

beds. Where conditions are favorable, Western Wheatgrass is found in almost pure stands, but is usually grown with other native grasses. It is used extensively as a waterway and terrace outlet grass, but by no means should be confined to such sites. Refer to General Management of Native Grasses.

PUBESCENT WHEATGRASS **(*Agropyron trichophorum*)**

Pubescent Wheatgrass is also a mild sod former. It is similar to Intermediate Wheatgrass in growth habits, seasonal development, cultural requirements, compatibility in mixtures with other grasses and Alfalfas, conservation value, and breeding habits. It differs from Intermediate Grass in being better adapted to lower fertile soils, alkaline soils, low rainfall areas, and high elevations.

ADAPTATION AND USE **Area 3-5-6**

Pubescent Wheatgrass has been mainly used in the Pacific Northwest and is being experimented with in other areas. In general, it has performed along the same lines with Intermediate Wheatgrass and Smooth Brome.

ADVANTAGES

It is the most palatable grass in the group, and has shown greater possibilities for use as pasture than as hay — When late maturing sod forming grass is required for conservation seeding, the choice is between Pubescent Wheatgrass and Intermediate Wheatgrass — The performance of both is compared with Smooth Brome — When rainfall is limited, Pubescent Wheatgrass has produced 50% more than

Brome — On sub-irrigated land that is alkaline, this grass produces better than Intermediate Wheatgrass or Smooth Brome.

MANAGEMENT

Pubescent Wheatgrass is easy to establish. The seedling vigor is good, and ground coverage is good the first year. In other growth characteristics, it is similar to Intermediate Wheatgrass, except that the forage is somewhat hairy. When seeded in mixtures, 8 pounds of seed are required per acre. Where it can be grown with a legume, it is planted in the spring. It is planted in the fall or early spring under low rainfall conditions. It is ready to graze when the foliage is four to six inches tall. Good production is maintained when utilization does not exceed an average of 70%. Fall and spring recovery are early, and good to excellent. For seed production each year, 40 to 60 pounds of nitrogen should be added. Refer to General Management of Native Grasses.

TALL WHEATGRASS **(*Agropyron elongatum*)**

Tall Wheatgrass, a long-lived perennial, is a coarse, tall, vigorous, stemmy bunch grass; even so, it is more palatable than its appearance indicates, and it is one of the highest yielding grasses yet tested.

ADAPTATION AND USE **Area 3-5-6**

Tall Wheatgrass is found in the inter-Mountain Rocky states areas of the Pacific Northwest, and has been working its way gradually into the Great Plains area. Its principal use is for pasture and hay.

ADVANTAGES AND MANAGEMENT

Tall Wheatgrass produces much feed for hay or pasture, as does Crested Wheatgrass, under semi-arid conditions at high altitudes, 4,500 feet to 6,000 feet, and it can furnish green feed for at least 30 days after the Crested Wheatgrass is mature. It has given very high yields on sub-irrigated, alkaline soils that once grew wheat but were abandoned because of wind erosion. It provides summer pasture to supplement native ranges and common grasses. Tall Wheatgrass has been late in blooming, heading and maturing in all locations where tested. In fact, it is one of the latest grasses under trial. Under irrigation and sub-irrigation, it can be compared with Tall Fescue. The seed of Tall Wheatgrass germinates readily, but the plants develop more slowly than others in this group, especially under semi-arid conditions. Stands are established from spring seedings on sub-irrigated soil, and from fall seedings on summer fallow in the semi-arid areas. About 8 pounds of seed per acre are required, when drilling is in 12-inch rows on semi-arid land. Fifteen pounds per acre are required to plant in six-inch rows on sub-irrigated land. This grass is slow to develop to full production in semi-arid land, and should not be grazed until the fourth season. When it is sub-irrigated, however, it is ready to use the second season. It is grown alone rather than in mixtures. Tall Wheatgrass is moderately self-fertile. It has late summer growth characteristics. Refer to General Management of Native Grasses.

SLENDER WHEATGRASS (*Agropyron pauciflorum*)

Slender Wheatgrass is a perennial domesticated native bunch grass that is adapted to use with Sweet Clover where the soils are lighter and the rainfall less than that required for Mountain Brome.

ADAPTATION AND USE Area 3-5

Found in North Central states and Pacific Northwest on well-drained sites. Will not tolerate poor drainage. Only slightly less drouth resistant than Crested Wheatgrass. Used for pasture before it matures; hay before it blooms, on predominantly marginal grainlands or range lands in sagebrush areas. Sow same as Crested Wheatgrass, 4 to 6 pounds per acre.

GENERAL MANAGEMENT OF NATIVE GRASS

WHAT TO SOW

One should at all times consult his local county agent and district soil conservation agent for the recommended varieties and mixtures to plant in his local area.

GENERAL RULE TO FOLLOW

In determining what to sow, it is natural to turn to the species that are dominant in good local pastures. It is important to use the species that are abundant in good pasture because the species population of depleted pastures may have changed so greatly that the best grasses will have disappeared almost entirely.

Generally speaking, you will usually plant a mixture of various species in order to take full advantage of their different superiorities and character-

istics in obtaining the best pasture for grazing and hay. The exact proportions of various species in a mixture is relatively unimportant, but the locally dominant ones should predominate in any mixtures seeded for permanent native pasture.

HOW TO PLANT

Most satisfactory stands are obtained by drilling. This permits accurate placement of the seed at a shallow depth and permits proper covering and packing of the seed. When seed is all placed at a proper depth and distributed uniformly over the field, the seeding rates need not be so great as when broadcasted.

Many native grasses have beards and chaffy or hairy hulls. These are difficult to drill with ordinary farm drilling equipment. The first method of handling such seed is to use special drilling equipment designed to plant light, chaffy, or hairy seeds without removing the beards or other fluffy materials. Drills of this type are relatively expensive, but in many soil conservation districts the district organization has purchased such grass drills and made them available to farmers at a nominal rental fee.

The native grasses may also be broadcasted. It is somewhat difficult to obtain uniform distribution by this method because of the light, fluffy nature of the seed. Furthermore, broadcasting does not place the seed at a uniform depth in the soil; however, if weather conditions are favorable following the seeding, broadcasted stands may be quite successful. In certain instances in the southwest, large acreages have been planted broadcast

by the use of low flying aircraft. In spite of the fact that broadcasting is somewhat more hazardous than drilling, it often is used in rough, relatively inaccessible places or extensive areas that need planting faster and cheaper (through aircraft) than is possible by drilling.

WHEN TO PLANT

Young seedlings of warm season native grasses are not winter hardy; therefore, spring planting is superior to fall planting of these species. Furthermore, most of the species show a decided tendency toward dormancy after harvest. In some species, this dormancy disappears by spring without treatment. In certain others, like Switchgrass, it disappears naturally by the second spring after harvest, and in Buffalo Grass, the dormancy disappears so slowly that for best results seed treatment is required. For this reason there would be no advantage from fall planting. Even if the seedlings were winter hardy, they would not emerge until spring in any event unless, of course, old seeds were planted. (There are, of course, exceptions to this, and in many areas some of the grasses are planted in the fall.)

Since the young seedlings are not very resistant to cold weather, and since they do not naturally emerge until relatively late in the spring, it has been found best to delay planting until there is no further danger of severe freezing. This provides an opportunity to prepare a seedbed and perhaps kill a crop or two of weeds by tillage in advance of the grass planting. The most suitable time for most of these grasses is mid-April in the east to mid-May in the west. Consult your county or soil con-

servation agent for detailed local conditions.

WHEATGRASSES

Sow Spring and Fall

Crested Wheatgrass
Intermediate Wheatgrass
Western Wheatgrass
Pubescent Wheatgrass
Tall Wheatgrass

HOW MUCH TO PLANT

The seeds of native grasses are relatively small, therefore there is a large number per pound. For this reason, it usually is considered adequate to plant enough seed material to furnish 6 to 8 pounds of actual seed per acre for the larger seeded species. For such extremely small-seeded species as Sand Lovegrass, 1 to 2 pounds per acre will be enough. The seed material of many grasses, such as the Grama grasses, the Bluestems, and others, is extremely light and chaffy. Often it contains much inert material in the form of empty hulls, pieces of stem and leaf, and various other chaffy materials. Purity percentages may vary from as little as 20 to 30 to perhaps 60 or 80. For this reason, it is extremely important to know the purity in order to determine how much actual seed is being planted. Materials having a purity of only 50% would, by this standard, require seeding rates of around 15 pounds per acre in order to provide 6 or 8 pounds of actual seed. In mixtures, the rate is the same with the total amount equaling the above.

Wheatgrasses by nature are larger seeds and can be cleaned efficiently by modern cleaning plants, which results in high purities and germina-

tions. The rate to sow varies in different areas from 4 to 8 pounds. When drilled, use 2 to 6 pounds in mixtures.

One should consult his county and soil conservation agent for details of planting in his area.

THE SEEDBED

Grasses have small seeds and relatively delicate seedlings. For this reason they should receive every possible encouragement to germinate and emerge promptly before the surface soil can dry out. Grasses need a firm, moist seedbed into which the seed can be placed at a shallow depth and pressed into firm contact with moist soil. Where erosion is a hazard, some sort of protective cover is needed to keep the soil in place until a sod can be established. The hay method of seeding or the prepared stubble mulch method is successful in such situations.

The grass seedbed needs to be as free as possible of weeds because most annual weeds grow more rapidly than do the seedlings of perennial grasses and will compete heavily for moisture, light, and plant nutrients, thereby delaying establishment, often by a season or more. A fallow or partial fallow preceding grass planting is desirable if it can be accomplished without creating too great a wind or water erosion hazard. The stubble mulch method, however, provides for such a period and gives the necessary cover.

GRAZING

Once a new stand of native grasses has been established, the principles involved in grazing management will be the same as those in native pas-

tures. It is necessary to graze moderately or the stands will be weakened, production will decline, and weeds and erosion will become problems. It is generally considered that one should not remove more than half of any season's growth by grazing. If half the top growth is allowed to remain, the plants will manufacture and store the required food reserves, and vigor of growth will be maintained. If one removes more than half the top growth each year, the vigor will decline and the half removed will continue to become smaller and smaller as depletion sets in. It is only where grazing is deferred for a number of weeks in the spring that one can safely remove more than half of the top growth. Deferred grazing allows the accumulation of tops and the storage of foods prior to grazing. Once this has been accomplished, close removal is much less harmful. Of course, the removal of tops should never be so close as to create an erosion hazard.

CARE AFTER SEEDING

The new stand of native grasses should be grazed until the plants are well established. Only in exceptional cases will this be as soon as the early part of their second growth period.

Ordinarily they need to go through two full growing seasons before they can be grazed without danger, and in some instances where establishment had been delayed by drouth or by weed competition, it may be necessary to protect them longer than this. Should weeds become a problem during the period of establishment, it may be necessary to mow. Clipping to control annual weeds is effective. The cutter bar should be set fairly high in order to cut the weeds without removing much, if any, of the grass tops. Once the grass sod has become fully established, weeds will be prevented from encroaching if grazing is carefully regulated.

NATIVE GRASSES MOST LIKELY TO BE SEEDDED IN KANSAS (A)

TALL GRASSES:

Big Bluestem
Sand Bluestem
Indian Grass
Switchgrass

MID-GRASSES:

Little Bluestem
Side Oats Grama
Sand Lovegrass
Western Wheatgrass
Caucasian Bluestem (B)

SHORT GRASSES:

Blue Grama
Buffalo Grass

- (A) When mixtures harvested from native stands are sown, certain other less abundant species will be included.
- (B) Introduced relative of native Bluestems that requires similar seedbed and planting conditions.

**TYPICAL MIXTURES FOR
EASTERN KANSAS**

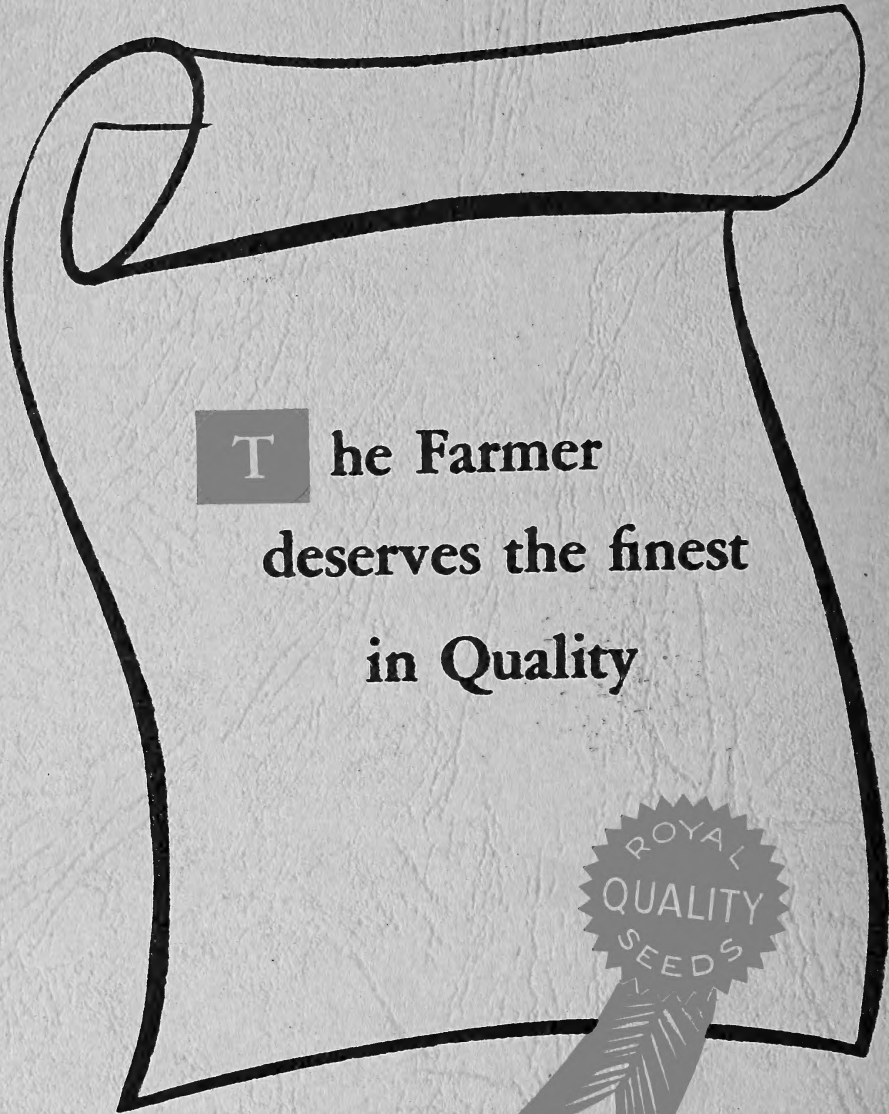
Typical mixtures for eastern Kansas would include Big and Little Bluestem, Indian Grass, Switchgrass, and perhaps a number of others in minor amounts, including Side Oats Grama. For sandy lands farther west the same species would be used except that Sand Bluestem would be substituted for Big Bluestem, and in all probability Sand Lovegrass would be added to the extent of one-half to one pound per acre. On the hard lands in western and central Kansas, the short grasses, principally Buffalo Grass and Blue Grama, are the dominant species in most pastures, but in good to excellent pastures, mid-grasses such as Side

Oats Grama, Little Bluestem, and Western Wheatgrass are found mixed with them to form a conspicuous and important overstory. Mixtures for such situations would include the short grasses and a small amount of mid-grasses. The harvesting of seed from local meadows or protected pastures may often provide seed of proper mixtures, and it is sure to give locally adapted strains. In addition, seed of certain wild grasses is available in seed markets either as native mixtures harvested from natural grasslands, or as pure species harvested from fields seeded for the production of grass seed.

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